

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)





See Form PCT/PEA/416

Applicant's or agent's file reference 102 985 a/ds	FOR FURTHER ACTION	
International application No. PCT/EP2004/004573	International filing date (day/month/year) 29.04.2004	Priority date (day/month/year) 30.04.2003
International Patent Classification (IPC) or national classification and IPC C09K11/02, C09K11/81		
Applicant NANOSOLUTIONS GMBH		

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 7 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☐ sent to the applicant and to the International Bureau) a total of sheets, as follows:
 - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

- This report contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 18.02.2005	Date of completion of this report 17.10.2005
Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Lehnert, A Telephone No. +31 70 340-4234 

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/004573

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-41 as originally filed

Claims, Numbers

1-22 as originally filed

Drawings, Sheets

1/2-2/2 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/004573

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	6-18
	No: Claims	1-5, 19-22
Inventive step (IS)	Yes: Claims	6-18
	No: Claims	1-5, 19-22
Industrial applicability (IA)	Yes: Claims	1-22
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

The following documents are referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1: DE 101 31 173 A (ITN NANO VATION GMBH) 16 January 2003

D2: US 2003/032192 A1 (MEYSAMY HEIKE ET AL) 13 February 2003

1. Clarity

1.1.

It is clear from the description on page 9, third and fourth paragraph that the following features are essential to the definition of the invention:

1. The shell material should be capable of preventing or reducing energy transfer from the core and the shell salt or oxide is non-luminescent (see page 10, line 9). This implies that the materials used for the core of the nanoparticles is different from the material used for the shell.
2. The shell material is different from the core material (see page 10, line 16).

However, claims 1-4 define the core-shell particles in such broad terms that also particles comprising a nanocrystalline material consisting of a homogenous composition fall under the scope of these claims as well: In this case the "core" and the "shell" are made of the same material.

Since independent claim 1 does not contain the essential features mentioned above it does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3 PCT that any independent claim must contain all the technical features essential to the definition of the invention.

1.2.

Claims which attempt to define the invention by a result to be achieved should not be allowed, in particular if they only amount to claiming the underlying technical problem (see PCT Guidelines, C III, 4.7). Claim 1 does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not defined:

The term "metal salt or oxide capable of preventing or reducing energy transfer from the core..." claims the result to be achieved by describing the underlying technical problem.

2. Novelty

2.1.

Document D1 discloses core-shell nanoparticles comprising a core of luminescent yttrium or europium compounds (see column 3, line 63); phosphates may also be used (see column 3, line 57). The shell is preferably made of metal oxides (see column 4, lines 15-20).

The material is used as luminescent pigment (see claim 6). The size of the core-shell nanoparticles is smaller than 20 nm (see claim 1).

Hence, the subject-matter of claims 1, 3-5, 19-22 is not novel (Article 33(2) PCT).

2.2.

Document D2 discloses (see paragraphs [0181] - [0189]) nanocrystalline $\text{LaPO}_4\text{Ce:Tb}$ particles with a particle size of 15 nm (see paragraph [0086]) and their use as luminescent materials.

As discussed above, claims 1-4 do not sufficiently distinguish between core-shell particles having the same material in the core and in the shell. Consequently, the scope of claims 1-4, 19-22 covers the nanoparticles as disclosed in document D2.

The subject-matter of claims 1-4, 19-22 is not novel (Article 33(2) PCT).

3. Inventive step

3.1. Dependent claims 6-10

None of the prior art documents cited in the search report describes luminescent core-shell nanoparticles as defined in claims 6-10. Thus, the subject-matter of these claims is novel.

Furthermore, the subject-matter of these claims appears to contain an inventive step for the following reasons:

Document D1 which represents the closest state of the prior art discloses core-shell nanoparticles comprising a core of luminescent yttrium or europium compounds (see column 3, line 63); phosphates may also be used (see column 3, line 57). The shell is preferably made of metal oxides (see column 4, lines 15-20).

The material is used as luminescent pigment (see claim 6). The size of the core-shell nanoparticles is smaller than 20 nm (see claim 1).

The subject-matter of claims 6-10 differs from the subject-matter of D1 in that there are different materials used for the core and the shell.

There is no technical effect on file related to this difference. Hence, the remaining problem to be solved is to provide alternative products.

However, as there is no indication in the prior art to use the core-shell combinations as disclosed in claims 6-10 the subject-matter of claims 6-10 is inventive (Article 33(3) PCT).

3.2. Process claims 11-18

Document D1 which represents the closest state of the prior art discloses core-shell nanoparticles comprising a core of luminescent yttrium or europium compounds (see column 3, line 63); phosphates may also be used (see column 3, line 57). The shell is preferably made of metal oxides (see column 4, lines 15-20).

The material is used as luminescent pigment (see claim 6). The size of the core-shell nanoparticles is smaller than 20 nm (see claim 1).

The material is prepared by a wet-chemical process in which the shell material is precipitated onto the core material.

The subject-matter of claim 11 differs from the subject-matter of D1 in that a complexing

material is used during the precipitation step.

There is no technical effect on file related to this difference. However, as it would not be obvious for the skilled person that in the presence of a complexing agent the precipitation reaction can be carried out the subject-matter of claim 11 and claims 12-18 depending on claim 11 involves an inventive step (Article 33(3) PCT).

4. Further remarks

In order to overcome the objections on clarity and novelty raised, the applicant may consider combining the subject-matter of claims 7 (defining the core material) and claim 9 (defining the shell material) with claim 1.

Such a claim might fulfil the criteria of novelty and inventive step.

The attention of the applicant is drawn to the fact that the application may not be amended in such a way that it contains subject-matter which extends beyond the content of the application as filed (Articles 19(2) and 34 (2)(b) PCT).